

Application No. 10/604,559  
Docket No. 129180  
Amendment dated September 26, 2005  
Reply to Office Action of July 26, 2005

### REMARKS

In the Office Action, the Examiner reviewed claims 1-37 of the above-identified US Patent Application, with the result that method claims 1-11 were allowed, claim 19 (which depends from independent method claim 12) was deemed to recite allowable subject matter, but the remainder of the claims were rejected under 35 USC §103. In response, Applicants have amended independent method claim 12 to incorporate the limitations of its dependent claim 18, and claim 18 and apparatus claims 21-37 have been canceled. As such, the amendments strictly comply with 37 CFR §1.116(a) as being limited to reducing and simplifying the issues remaining in the examination of Applicants' application, namely, cancellation of apparatus claims 21-37 (rendering the second of two 35 USC §103 rejections moot) and the cancellation of dependent claim 18 and incorporation of its entire subject matter into its parent claim 12. Consequently, the above amendments do not raise new issues that would require further consideration and/or search by the Examiner, and place the claims in better condition for appeal. MPEP §714.13.

Favorable reconsideration and allowance of remaining claims 1-17, 19, and 20 are respectfully requested in view of the above amendments and the following remarks.

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Claims 12-18 and 20 were rejected under 35 USC §103 in view of U.S. Patent No. 6,725,722 to Murphy et al. (Murphy). As noted above, Applicants have amended independent claim 12 to incorporate the limitations of its dependent claim 18. As such, claim 12 now requires (as represented in Figures 5 and 6) that each of the bolt holes 20 has a center located a constant distance "R" from a center of the central hub bore 18 along one of the radials 34 of the turbine wheel 10, each of the plurality of points 36 is located a distance "d" from the center of the bolt hole 20 and a distance "r" from the center of the central hub bore 18, the distances R, d and r define sides of a right triangle with an angle of ninety degrees between the sides corresponding to the distances d and r, an angle  $\alpha$  between the sides corresponding to the distances d and R, and an angle  $\theta$  between the sides corresponding to the distances r and R, and the plurality of points 36 are located within the turbine wheel 10 by the equation  $\cos^2\theta + \cos^2\alpha = 1$ .

In maintaining the rejection of claim 18 in view of Murphy, the Examiner explained

although the equation  $[\cos^2\theta + \cos^2\alpha = 1]$  is not given, Murphy et al do indicate steering the ultrasonic beam 360 degrees around the hole such that a complete circumferential or helical scan of the material about the holes is performed in order to create a "scan/index coverage

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path," see col. 5, lines 8-37. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the geometrical equation given since Murphy et al indicate performing a circumferential scan.

However, the "complete circumferential or helical scan" disclosed by Murphy and referred to in the above passage does not and would not yield or use the equation recited in Applicants' amended claim 12.

First, Murphy's "complete circumferential or helical scan" refers to a process of interrogating material surrounding the pinhole 50 in which the probe 40 is placed. See column 5, lines 16-18. In contrast, Applicants' scan recited in claim 12 and portrayed in Figure 6 is neither circumferential nor helical relative to the bolt hole 20 in which Applicants' transducer unit 22 is placed. Instead, from Figures 5 and 6 it can be seen that Applicants' scan is of a loci 40 of points 36 established by perpendiculars between wheel radials 34 and a bolt hole 20 in which Applicants' transducer unit 22 is placed. Therefore, the scanned loci 40 of points 36 do not surround Applicants' transducer unit 22 or any bolt hole 20 in which it is placed, but instead lie entirely between the transducer unit 22 and the hub bore 18. Because Murphy's scan covers points surrounding the probe 40, Murphy's process does not employ and would not have any reason to employ the equation now recited in claim 12 as being used in Applicants' process.

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Second, Murphy is directed to finding cracks 30 in a turbine wheel 10 that have propagated from pinholes 22 and 24 immediately surrounding a pinhole 50 in which an ultrasonic probe 40 has been inserted. The cracks 30 are shown and described as being oriented in the axial-circumferential direction of the wheel 10. Murphy's method is not disclosed as detecting cracks oriented in the axial-radial plane of the wheel 10. Because of the orientation of the cracks 30 sensed by Murphy, Murphy's method does not operate or suggest an operation that relies on ultrasonic signals that are reflected by defects oriented substantially perpendicular to the ultrasonic signals that were the source of the reflected ultrasonic signals, as claimed by Applicants. Therefore, Murphy does not employ and would not have a reason to employ the equation now recited in Applicants' process of claim 12.

For the above reasons, Applicants respectfully request withdrawal of the remaining rejection of claims 12-17, 19, and 20.


### Closing

In view of the above, Applicants respectfully request that their patent application be given favorable reconsideration. Should the Examiner have any questions with respect to any matter now of record, Applicants' representative

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may be reached at (219) 462-4999.

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